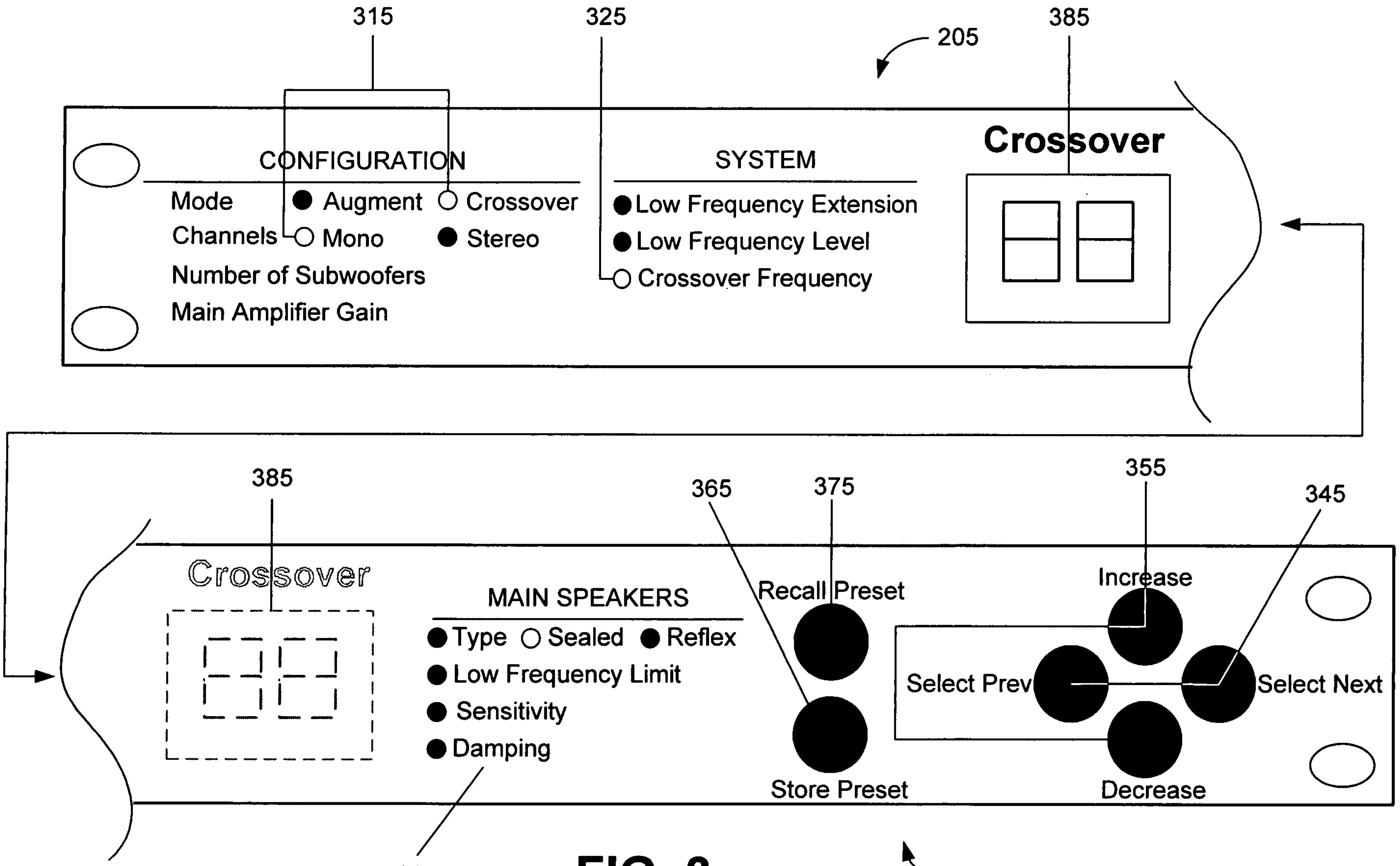

315
325
205
385
CONFIGURATION
Mode ● Augment ○ Crossover
Channels ○ Mono ● Stereo
Number of Subwoofers
Main Amplifier Gain
SYSTEM
● Low Frequency Extension
● Low Frequency Level
○ Crossover Frequency
Crossover
385
365
375
355
345
Crossover
MAIN SPEAKERS
● Type ○ Sealed ● Reflex
● Low Frequency Limit
● Sensitivity
● Damping
Recall Preset
Store Preset
Increase
Select Prev
Select Next
Decrease
335
205

FIG. 3

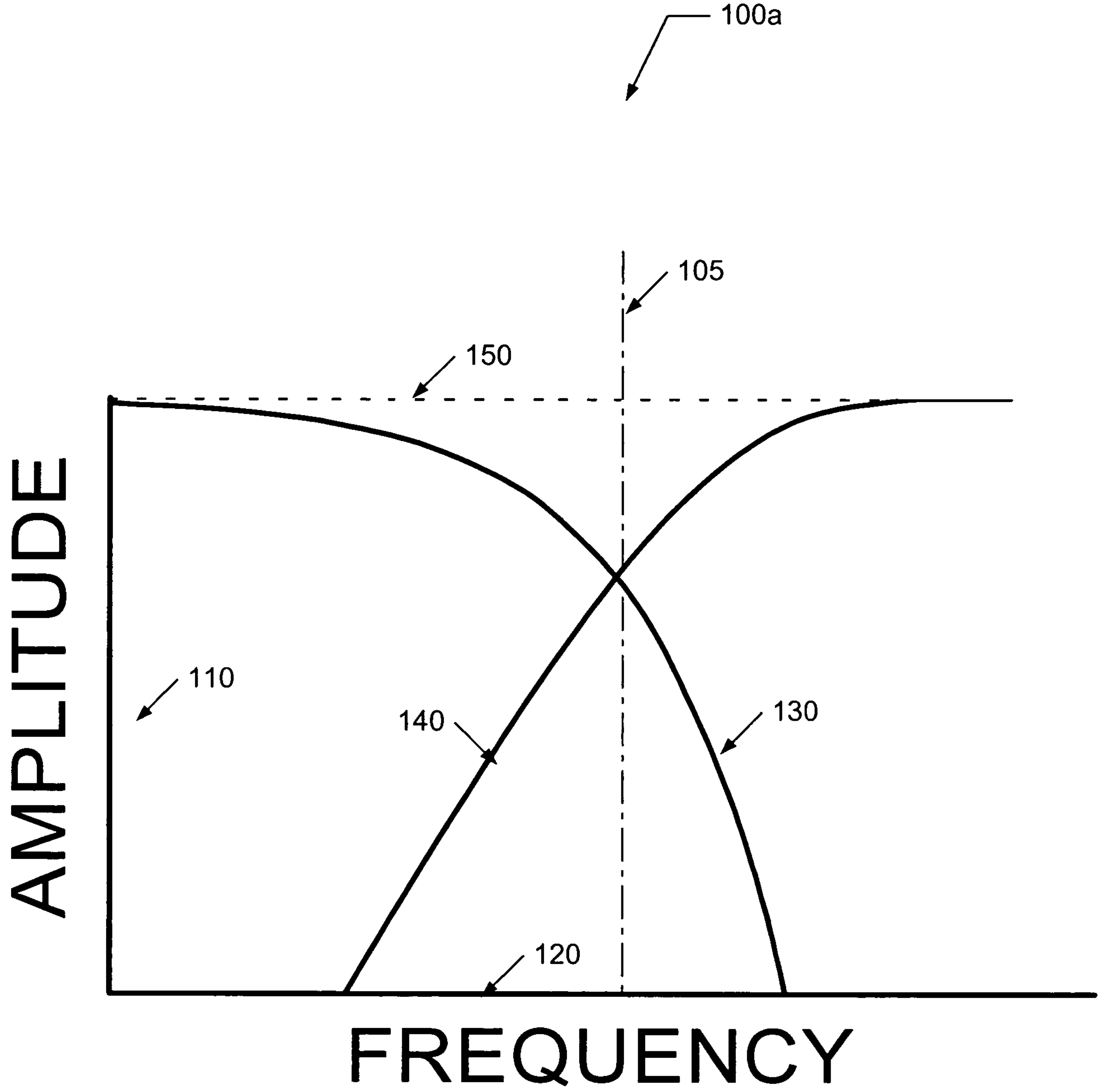


FIG. 1

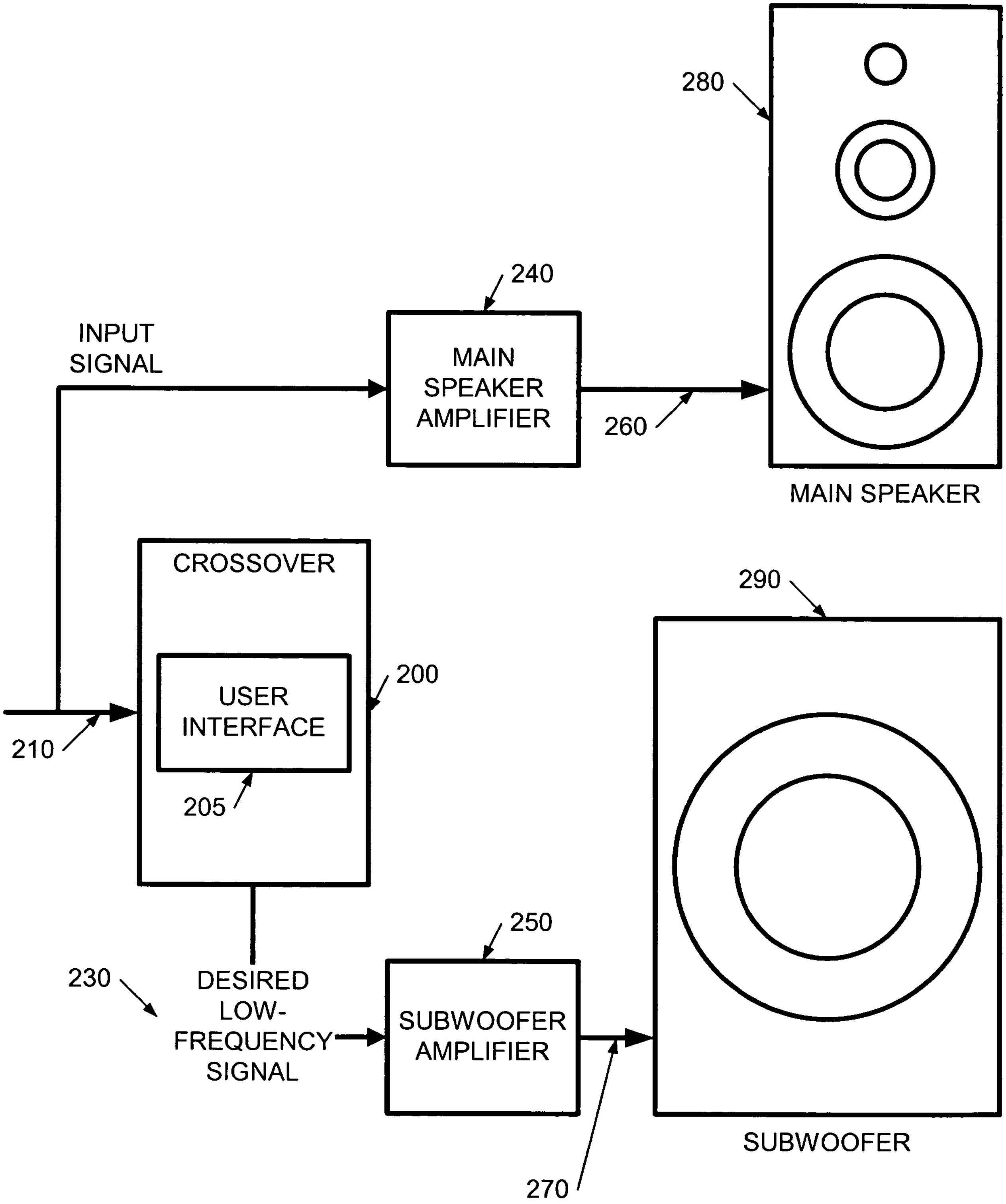

280
240
INPUT
SIGNAL
MAIN
SPEAKER
AMPLIFIER
260
MAIN SPEAKER
CROSSOVER
290
USER
INTERFACE
200
210
205
250
230
DESIRED
LOW-
FREQUENCY
SIGNAL
SUBWOOFER
AMPLIFIER
SUBWOOFER
270

FIG. 2

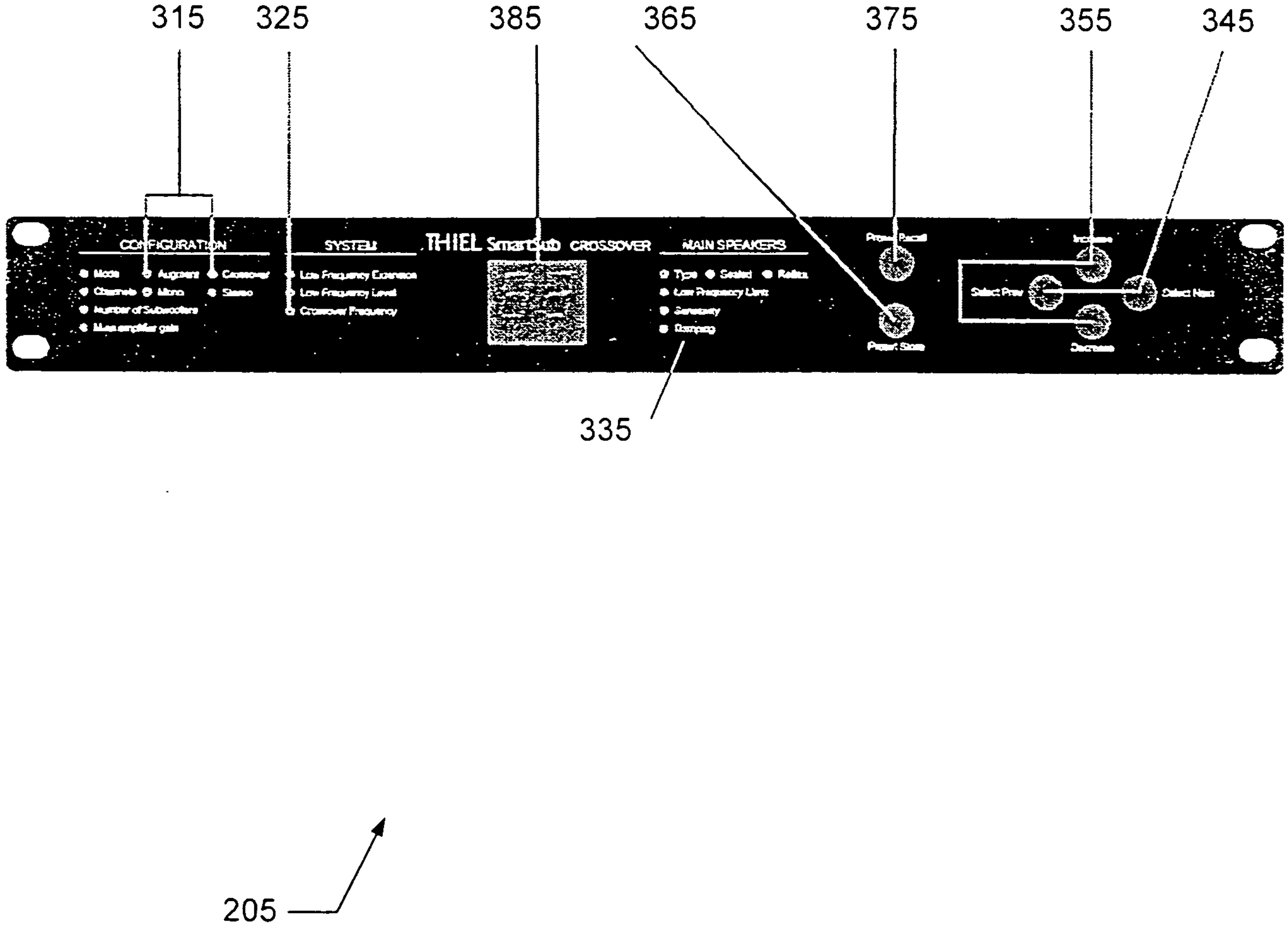

315
325
385
365
375
355
345
CONFIGURATION
SYSTEM
THIEL SmartSub CROSSOVER
MAIN SPEAKERS
Mode
Augment
Crossover
Channels
Mono
Stereo
Number of Subwoofers
Main amplifier gain
Low Frequency Extension
Low Frequency Level
Crossover Frequency
Type
Sealed
Reflex
Low Frequency Limit
Sensitivity
Damping
Preset Recall
Preset Store
Increase
Select Prev
Select Next
Decrease
335
205

FIG. 3

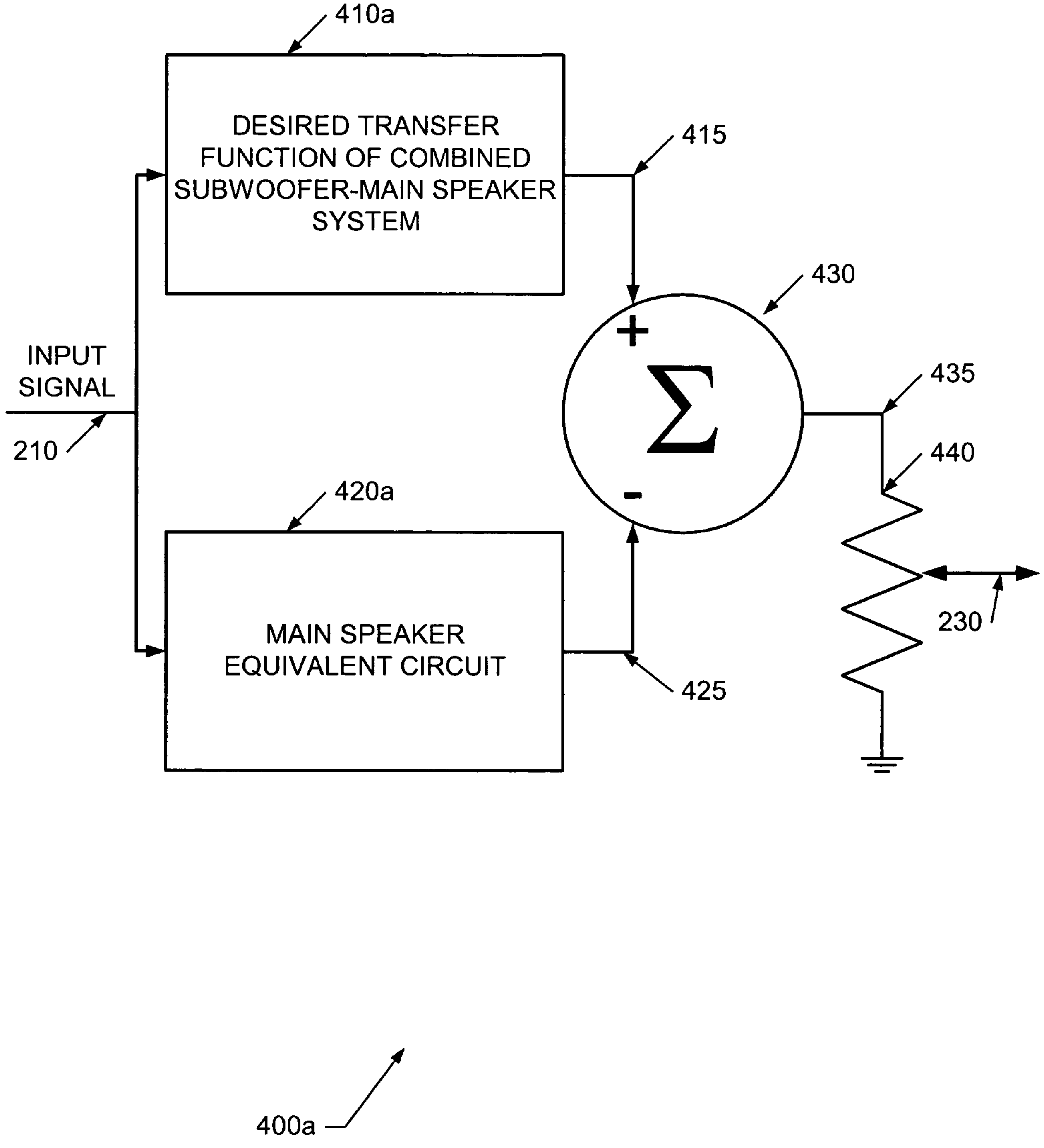

DESIRED TRANSFER FUNCTION OF COMBINED SUBWOOFER-MAIN SPEAKER SYSTEM
+
Σ
-
INPUT SIGNAL
MAIN SPEAKER EQUIVALENT CIRCUIT

FIG. 4A

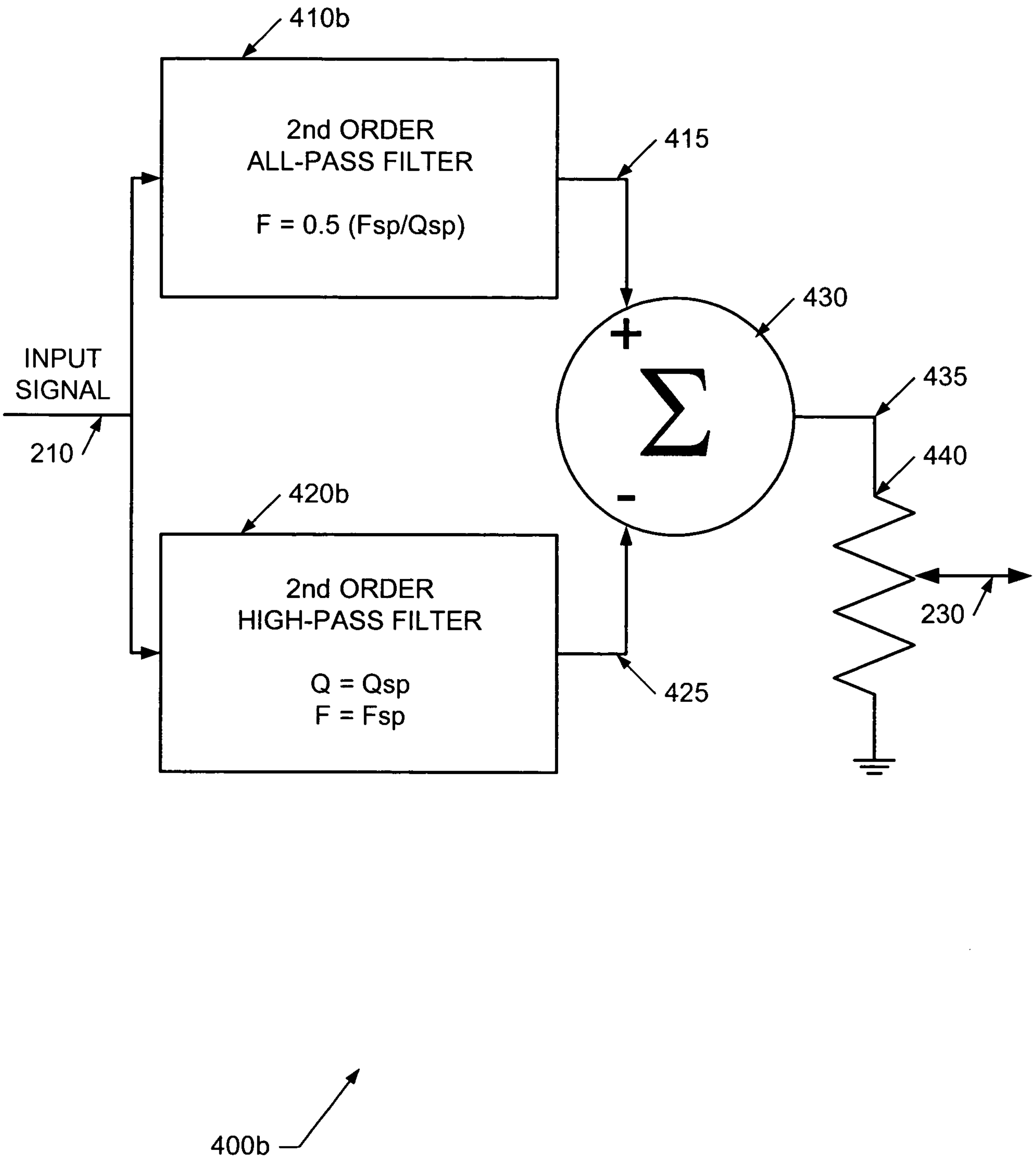

410b
2nd ORDER
ALL-PASS FILTER
F = 0.5 (Fsp/Qsp)
415
430
+
Σ
-
INPUT
SIGNAL
210
435
440
420b
2nd ORDER
HIGH-PASS FILTER
Q = Qsp
F = Fsp
425
230
400b

FIG. 4B

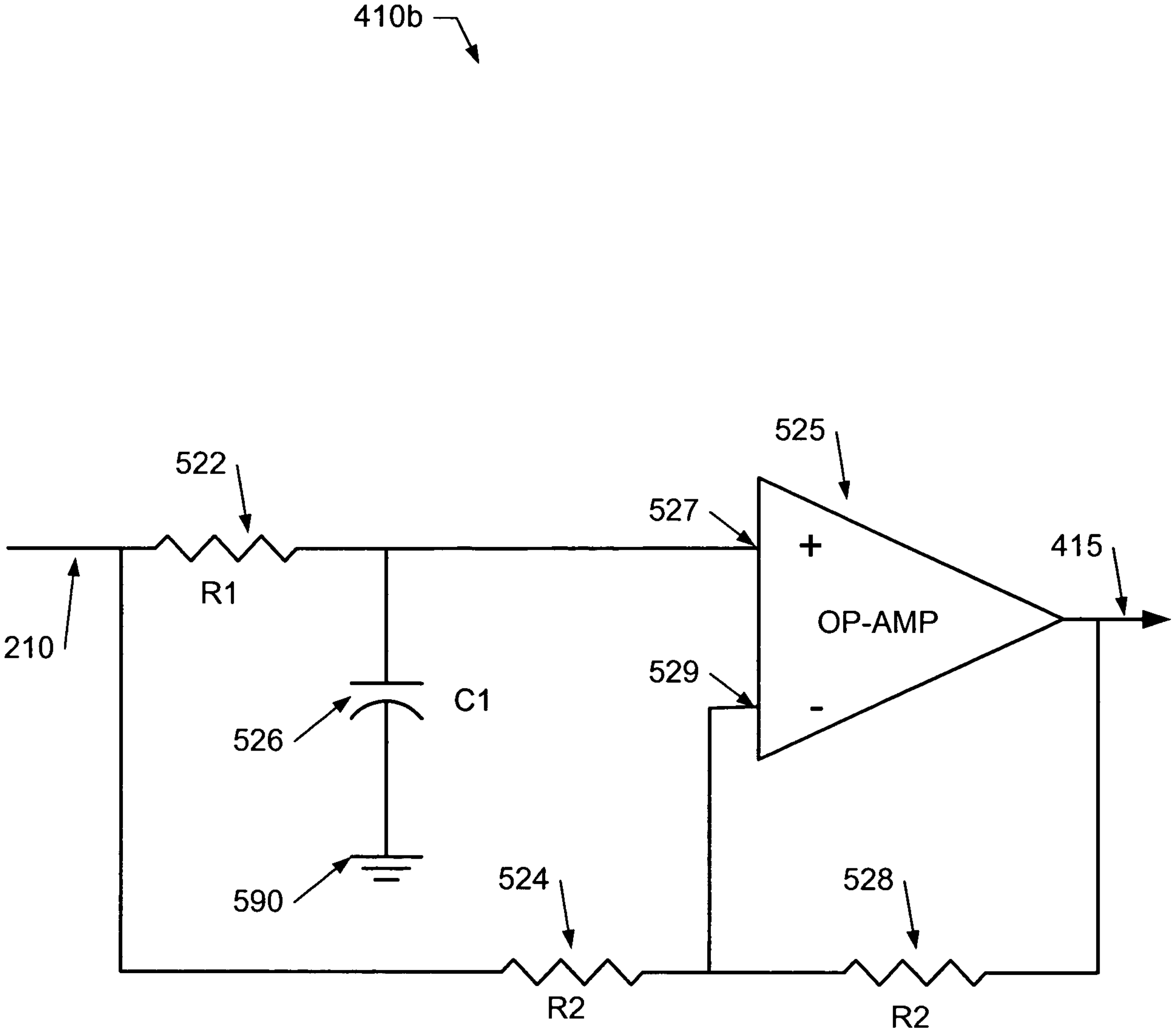


FIG. 5A

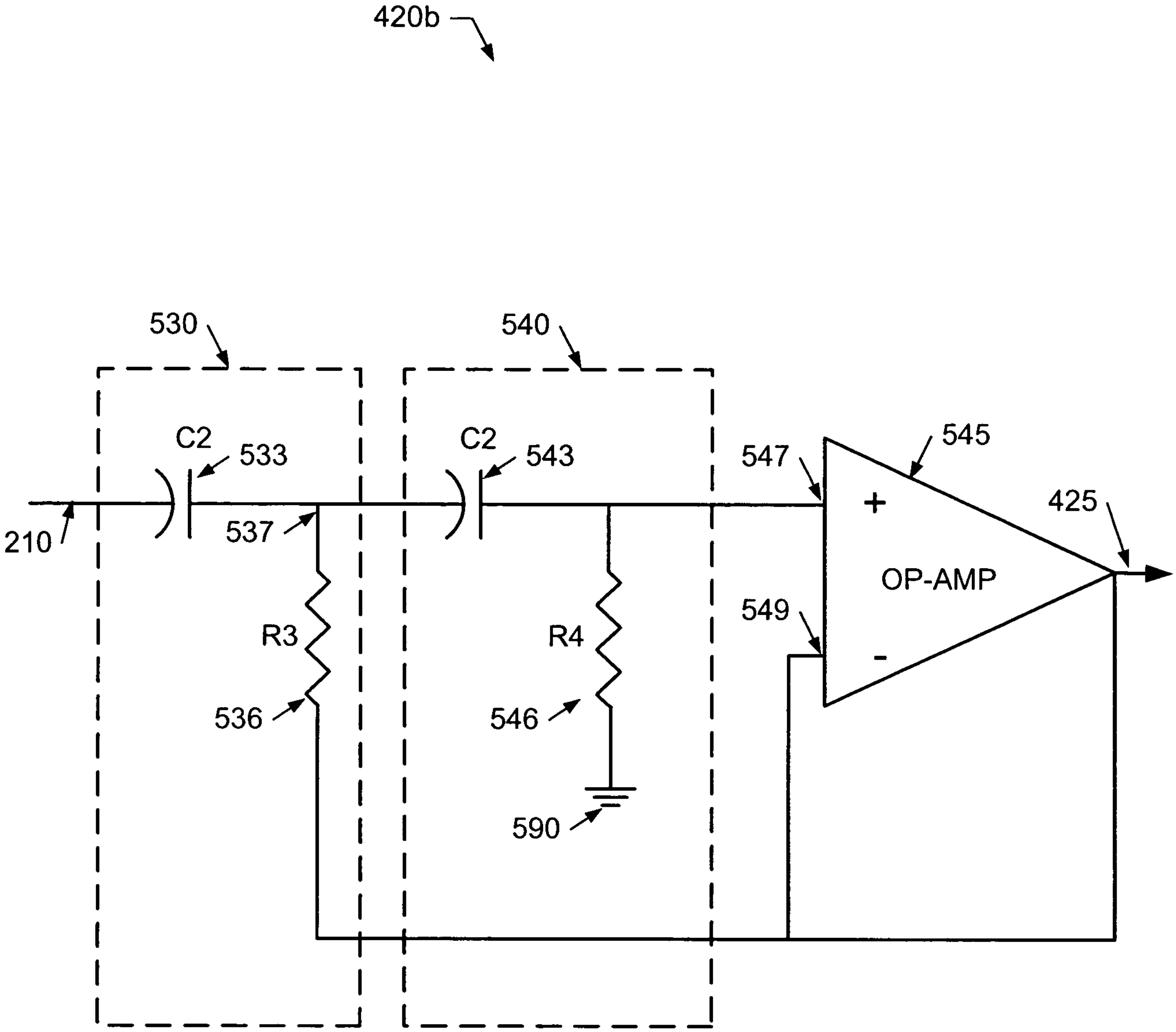

C2
C2
+
OP-AMP
-
R3
R4

FIG. 5B

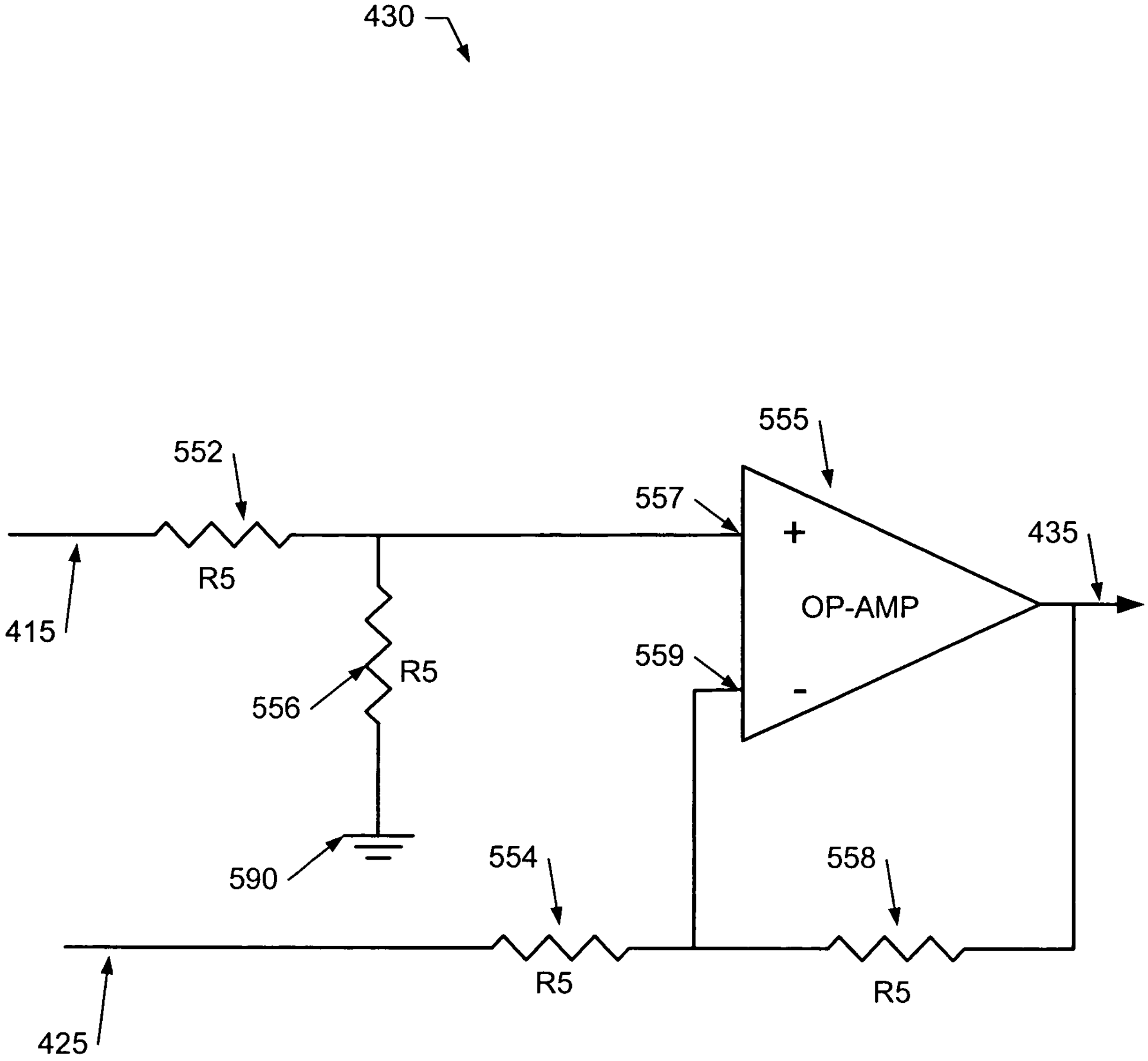


FIG. 5C

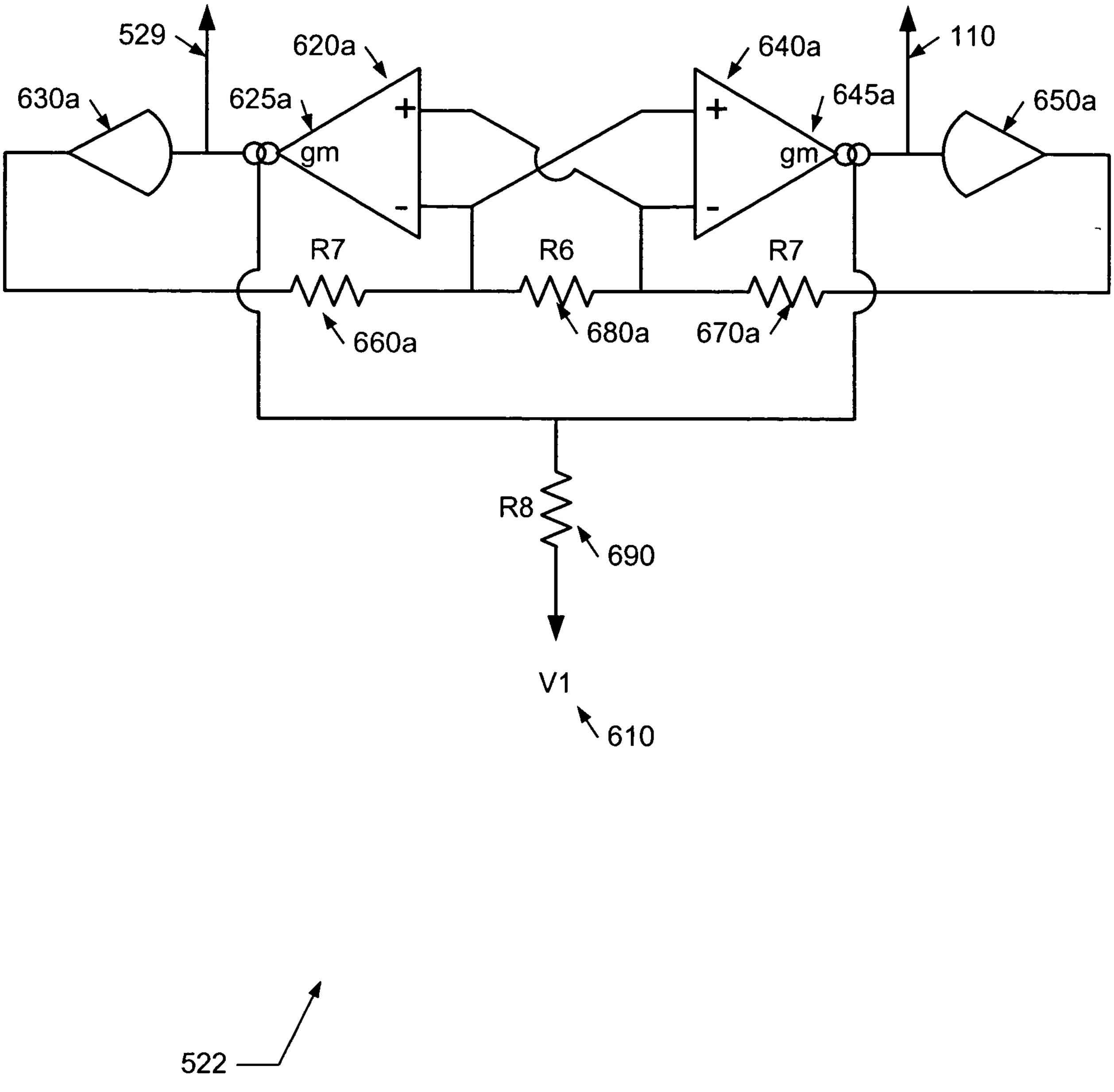
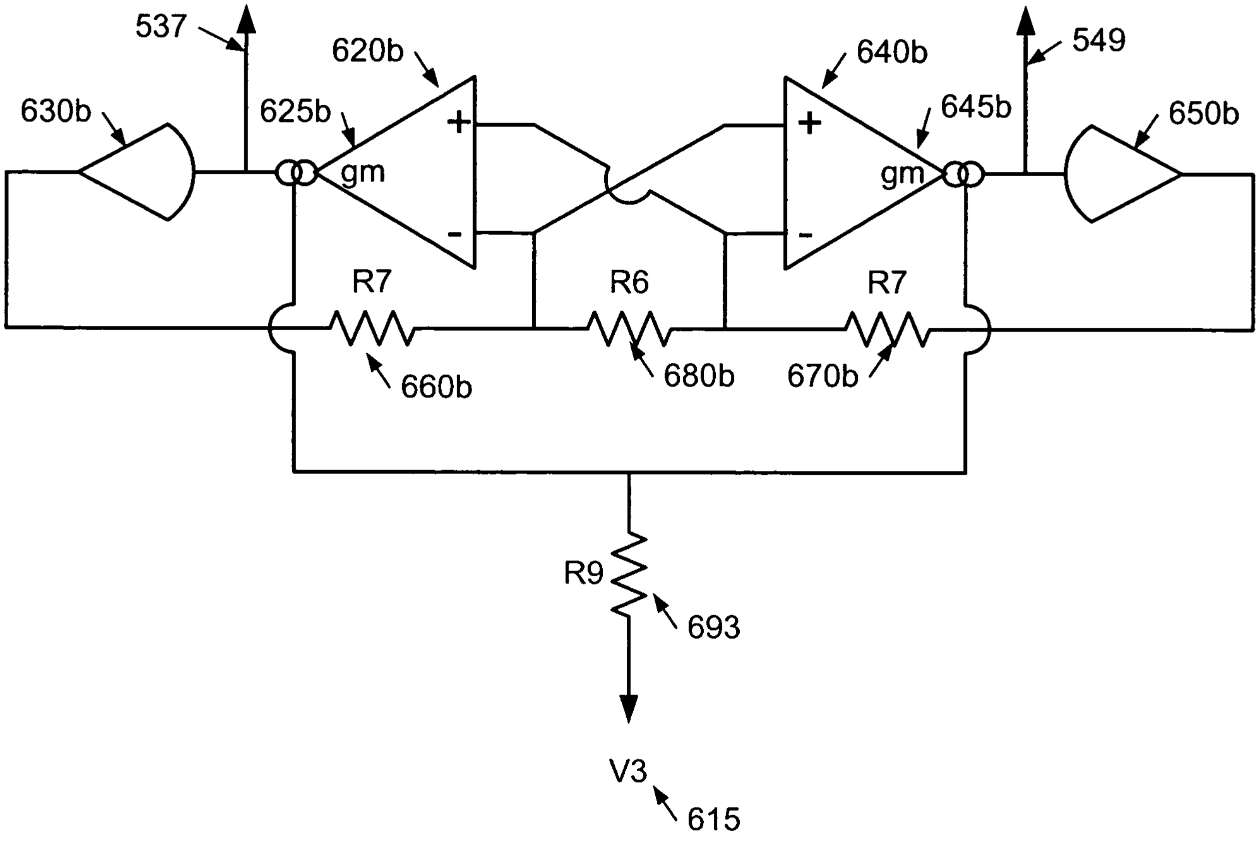

529
620a
640a
110
630a
625a
645a
650a
gm
gm
+
-
+
-
R7
R6
R7
660a
680a
670a
R8
690
V1
610
522

FIG. 6A


537
620b
640b
549
630b
625b
645b
650b
gm
gm
+
-
+
-
R7
R6
R7
660b
680b
670b
R9
693
V3
615

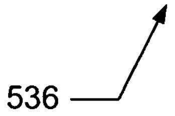
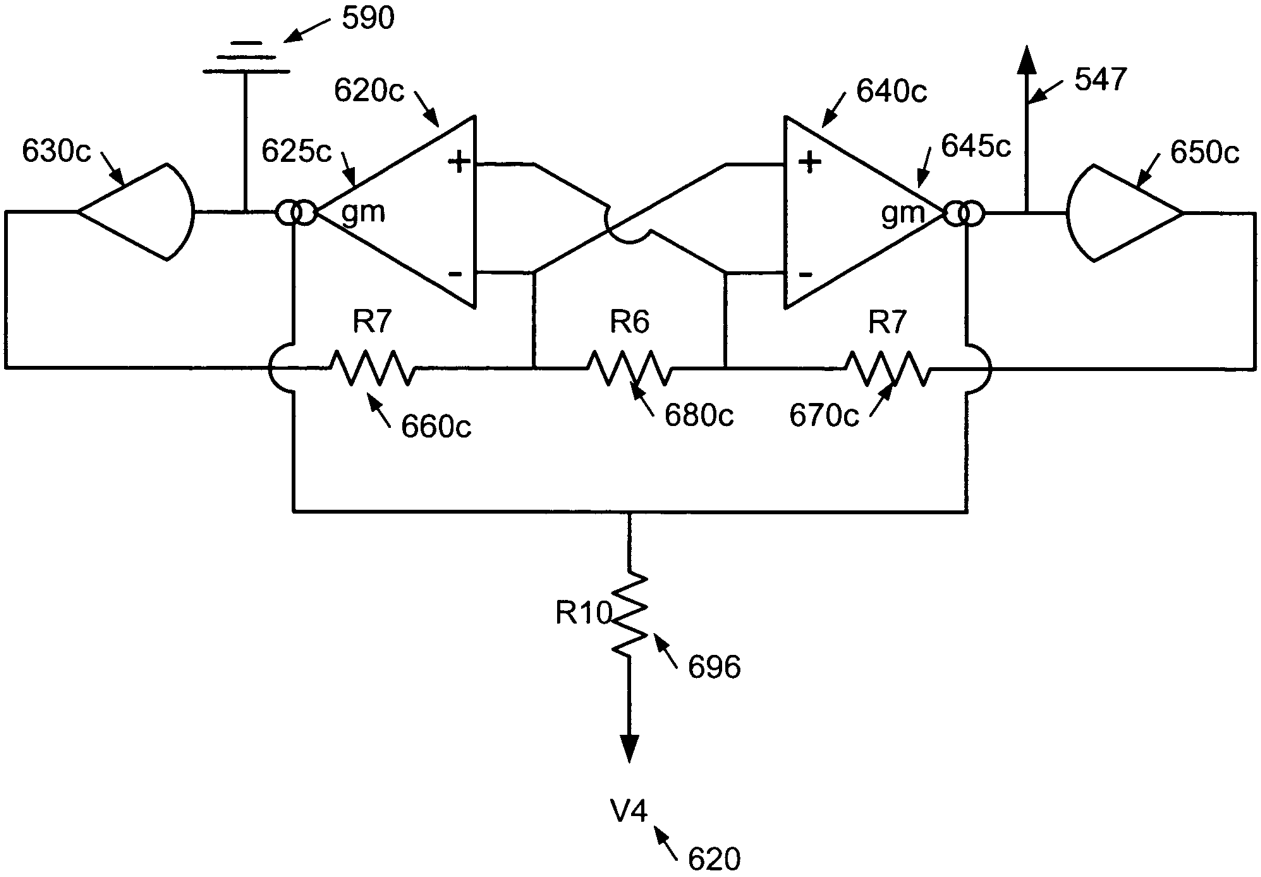

536

FIG. 6B


590
547
620c
640c
630c
625c
645c
650c
gm
gm
+
-
+
-
R7
R6
R7
660c
680c
670c
R10
696
V4
620

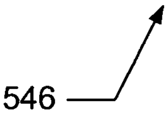

546

FIG. 6C

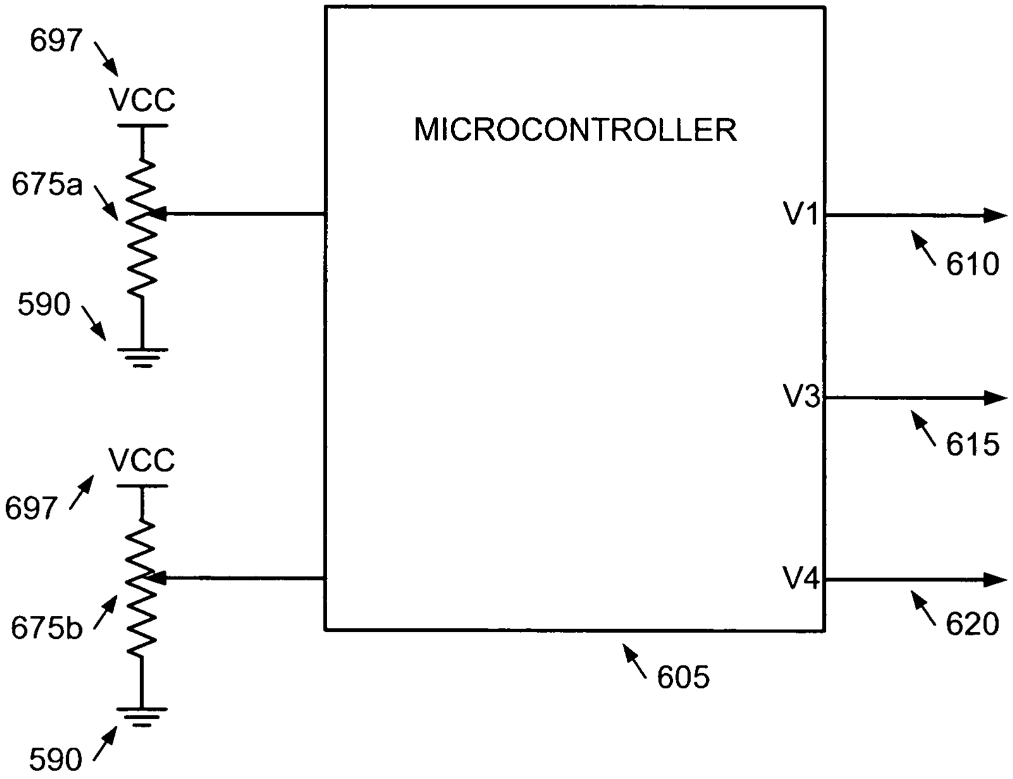

VCC
MICROCONTROLLER
V1
V3
VCC
V4

FIG. 6D

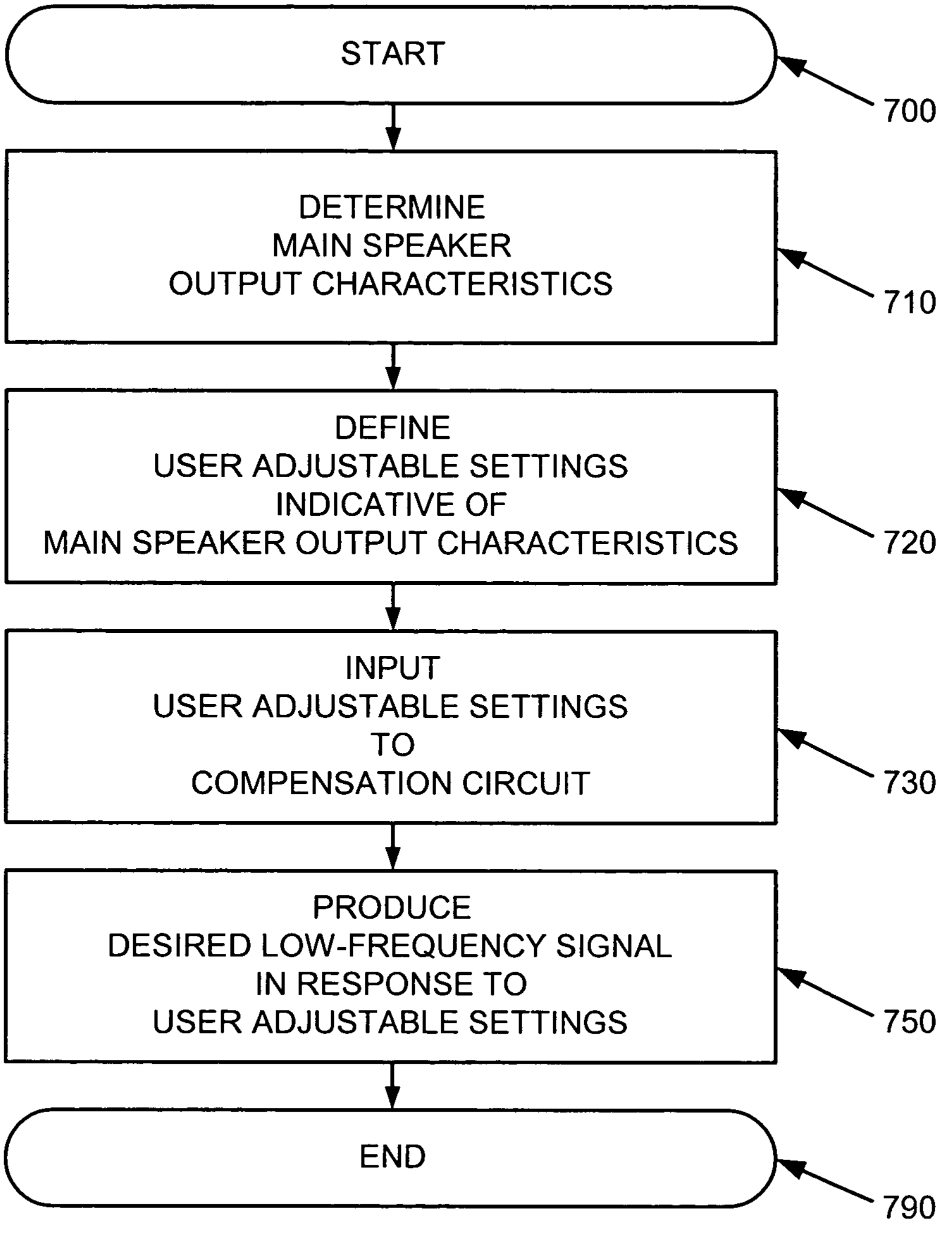

START
700
DETERMINE MAIN SPEAKER OUTPUT CHARACTERISTICS
710
DEFINE USER ADJUSTABLE SETTINGS INDICATIVE OF MAIN SPEAKER OUTPUT CHARACTERISTICS
720
INPUT USER ADJUSTABLE SETTINGS TO COMPENSATION CIRCUIT
730
PRODUCE DESIRED LOW-FREQUENCY SIGNAL IN RESPONSE TO USER ADJUSTABLE SETTINGS
750
END
790

FIG. 7A

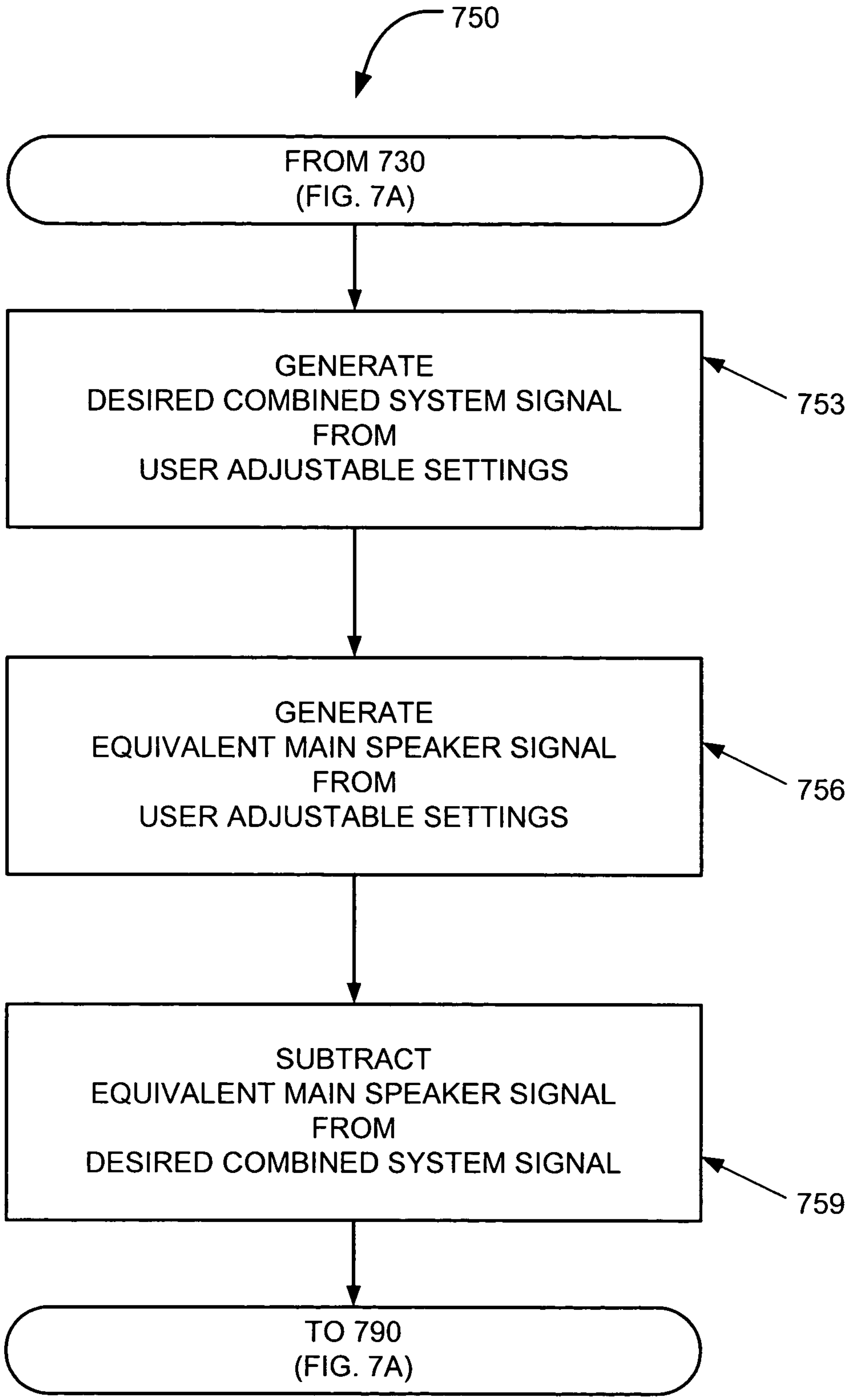

750
FROM 730
(FIG. 7A)
GENERATE
DESIRED COMBINED SYSTEM SIGNAL
FROM
USER ADJUSTABLE SETTINGS
753
GENERATE
EQUIVALENT MAIN SPEAKER SIGNAL
FROM
USER ADJUSTABLE SETTINGS
756
SUBTRACT
EQUIVALENT MAIN SPEAKER SIGNAL
FROM
DESIRED COMBINED SYSTEM SIGNAL
759
TO 790
(FIG. 7A)

FIG. 7B